

WHAT IS CLAIMED IS:

1 1. An optical scanning apparatus for optically scanning a
2 scene, comprising:

3 an emitting arrangement including a first prism
4 arranged and adapted to deflect a light beam on an emitted
5 beam path emitted to the scene;

6 a receiving arrangement including a second prism
7 arranged and adapted to deflect a reflection beam on a
8 received beam path received from the scene as a reflected
9 portion of said light beam that is reflected from the
10 scene; and

11 a drive axle that is rotatably supported;

12 wherein said first prism and said second prism are
13 both respectively rigidly connected in common to said drive
14 axle, so that said drive axle, said first prism and said
15 second prism are rotatable in common as a unit.

1 2. The optical scanning apparatus according to claim 1,
2 wherein said drive axle includes two axle arms, said first
3 prism is rigidly mounted on a first one of said axle arms,
4 and said second prism is rigidly mounted on a second one of
5 said axle arms.

1 3. The optical scanning apparatus according to claim 2,
2 wherein said drive axle has opposite first and second
3 terminal ends, said first axle arm includes and terminates
4 at said first terminal end, said second axle arm includes

5 and terminates at said second terminal end, said first
6 prism is mounted on said first terminal end, and said
7 second prism is mounted on said second terminal end.

1 4. The optical scanning apparatus according to claim 3,
2 further comprising a motor body, wherein said drive axle
3 forms a rotor axle cooperating with and protruding from
4 said motor body.

1 5. The optical scanning apparatus according to claim 4,
2 wherein said first and second axle arms respectively
3 protrude in opposite directions from opposite sides of said
4 motor body, and said motor body is located between said
5 first and second prisms.

1 6. The optical scanning apparatus according to claim 1,
2 further comprising a motor body, wherein said drive axle
3 forms a rotor axle cooperating with and protruding from
4 said motor body, and said drive axle and said motor body
5 together form a motor.

1 7. The optical scanning apparatus according to claim 6,
2 wherein said drive axle is a single one-piece axle.

1 8. The optical scanning apparatus according to claim 6,
2 wherein said drive axle establishes a direct-drive
3 connection, without any intervening transmission mechanism,

to said first and second prisms which are rigidly connected thereto.

9. The optical scanning apparatus according to claim 6, wherein said motor is an electronically commutated, multi-phase d.c. motor.

10. The optical scanning apparatus according to claim 6, wherein said motor body comprises an internal stator and an external rotor that is rigidly connected to or integral with said drive axle.

11. The optical scanning apparatus according to claim 10, wherein said external rotor includes an outer rotor rim provided with position indicator indicia that indicate a rotational position of said rotor.

12. The optical scanning apparatus according to claim 6, wherein a selected one of said prisms is fixedly secured to said rotor, which forms a mounting plate therefor.

13. The optical scanning apparatus according to claim 12, further comprising a positioning pin that protrudes from said rotor into a positioning hole provided in said selected one of said prisms, so as to fix a rotational alignment between said rotor and said selected one of said prisms.

1 **14.** The optical scanning apparatus according to claim 6,
2 further comprising a mounting plate that is rigidly
3 connected to said drive axle, wherein one of said prisms is
4 fixedly secured to said mounting plate so as to rotate
5 therewith.

1 **15.** The optical scanning apparatus according to claim 6,
2 wherein said motor includes a fixed non-rotatable stator,
3 a rotor rigidly connected to said shaft, a motor bracket
4 which fixedly carries said stator and by which said motor
5 can be fixedly mounted in said apparatus, and a bearing
6 arrangement that rotatably supports said drive axle
7 relative to said motor bracket.

1 **16.** The optical scanning apparatus according to claim 15,
2 wherein said stator comprises a motor coil with a
3 three-phase winding.

1 **17.** The optical scanning apparatus according to claim 1,
2 wherein said first and second prisms are respectively
3 transparent to the light beam and the reflection beam.

1 **18.** The optical scanning apparatus according to claim 1,
2 wherein:
3 said emitting arrangement further includes a first
4 lens arrangement interposed in said emitted beam path
5 between said first prism and the scene; and

6 said receiving arrangement further includes a second
7 lens arrangement interposed in said received beam path
8 between the scene and said second prism.

1 **19.** The optical scanning apparatus according to claim 1,
2 wherein:

3 said emitting arrangement further includes a radiation
4 source adapted to emit the light beam;

5 said receiving arrangement further includes a
6 photodetector adapted to detect the reflection beam; and

7 said radiation source is positioned relative to said
8 first prism and said photodetector is positioned relative
9 to said second prism so that the reflection beam impinges
10 onto the photodetector.

1 **20.** The optical scanning apparatus according to claim 19,
2 wherein said radiation source is positioned relative to
3 said first prism and said photodetector is positioned
4 relative to said second prism so that the light beam is
5 deflected by total internal reflection in said first prism,
6 the reflection beam is deflected by total internal
7 reflection in said second prism, and a rotating of said
8 first and second prisms scans the light beam and the
9 resulting reflection beam across the scene.

1 **21.** The optical scanning apparatus according to claim 19,
2 wherein said radiation source comprises a laser diode.

1 **22.** An optical distance radar system for a motor vehicle
2 incorporating the optical scanning apparatus according to
3 claim 1.

1 **23.** An optical scanning apparatus for optically scanning a
2 scene, comprising:

3 a radiation source adapted to emit a light beam;

4 a first prism arranged to receive and deflect the
5 light beam to the scene;

6 a second prism arranged to receive and deflect a
7 reflection beam formed as a portion of the light beam
8 reflected from the scene;

9 a photodetector arranged to receive the reflection
10 beam that is deflected by said second prism; and

11 a drive motor comprising a stator, a rotatable rotor,
12 and a rotatable drive shaft connected rigidly to said
13 rotor;

14 wherein said first and second prisms are both
15 connected rigidly to said drive shaft along a single
16 rotation axis common to both of said first and second
17 prisms.

1 **24.** The optical scanning apparatus according to claim 23,
2 wherein said drive shaft protrudes in two opposite
3 directions from two opposite sides of said rotor, and said
4 rotor and said stator are arranged between said first and
5 second prisms.